RESEARCH PROPOSAL

"PRICE BEHAVIOUR AND EXPORT PERFORMANCE OF TURMERIC: A STATISTICAL ANALYSIS"

A synopsis submitted to

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“Price Behaviour and Export Performance of Turmeric: A Statistical Analysis”

1. Introduction:

Turmeric is an ancient spice, a native of South East Asia, used from antiquity as dye and a condiment. It is a product of *Curcuma longa*, a rhizomatous herbaceous perennial plant belonging to the ginger family Zingiberaceae. As many as 133 species of *Curcuma* have been identified worldwide. Most of them have common local names and are used for various medicinal formulations. In the Indian Ayurveda system of herbal medicine, turmeric is known as strengthening and warming to the whole body.

The turmeric plant needs temperatures between 20°C and 30°C and a considerable amount of annual rainfall to thrive. Individual plants grow to a height of 1 m, and have long, oblong leaves. India produces nearly the world’s entire turmeric crop and consumes 80% of it. Indian turmeric is considered to be the best in the world. Erode, a city in the South Indian state of Tamil Nadu, is the world’s largest producer of and the most important trading centre for turmeric. It is also known as “Yellow City,” “Turmeric City,” or “Textile City.” Sangli, Hingoli and Basmat city of Maharashtra is importance as a production and trading site for turmeric.

Increasing demand for turmeric owing to the increasing use of turmeric in the food industry is a key factor driving the growth of the global turmeric market. In addition, the growing demand for herbal cosmetics products coupled with the increasing use of turmeric in cosmetic products is the other factor expected to fuel the market growth in the forecast period. Moreover, increasing consumer interest in organic turmeric and increasing research and development in medical applications of turmeric are likely to drive market growth. However, the availability of various alternatives to turmeric in the food and beverage industry such as food colours and, stringent import and export regulations imposed by the government may restrain the market growth to a certain extent.

The increasing popularity of ethnic food is a new trend observed in European countries. The spice market is expected to register significant growth in the European countries owing to shifting consumer interest toward ethnic taste. Another observed trend is the rising demand for herbal products in European countries. The global turmeric market size is forecast to be valued at US$ 4,419.3 million in 2023. Total turmeric sales worldwide are likely to rise at 5.5% CAGR throughout the forecast period taking the

overall market valuation past US$ 7,579.2 million by 2033.Growing usage of turmeric in food & beverage products, pharmaceuticals, cosmetics, personal care products, and textiles is driving the global turmeric industry.

They are seeing the phenomenon of the price of turmeric above, very interested in predicting an accurate turmeric price so as not to lose the investment. From these problems, it is necessary to predict turmeric prices when buying at low prices and when selling at high prices to get a profit. Many researchers write forecasting models that are easy to use for forecasting, but sometimes forecasting accuracy is not good. This research is equipped with the modern technique i.e. Artificial Neural Network, Neural Network Autoregressive (NNAR) forecasting model, which is relatively new to the Neural Network (NN) model and can be used in open-source software programs.

As an important spice, turmeric is growing in India since ancient times mainly for its culinary and medicinal properties, particularly in Ayurveda. Various property of this spice has extended its use as a component of food additive and other natural dies, also as a clinical component in the cosmetic and pharmaceutical industries and many other uses. A recent pandemic, COVID-19, also further valued the health benefits in the form of an immunity booster. For India, this gives immense benefit as one of the important producers and also a major global exporter to not only benefit economically also to serve the globe in a better way. Additionally, the greatest diversity of this spice in the form of a number of species (around 40 to 45) is a great advantage to bring new innovation and its derivatives.

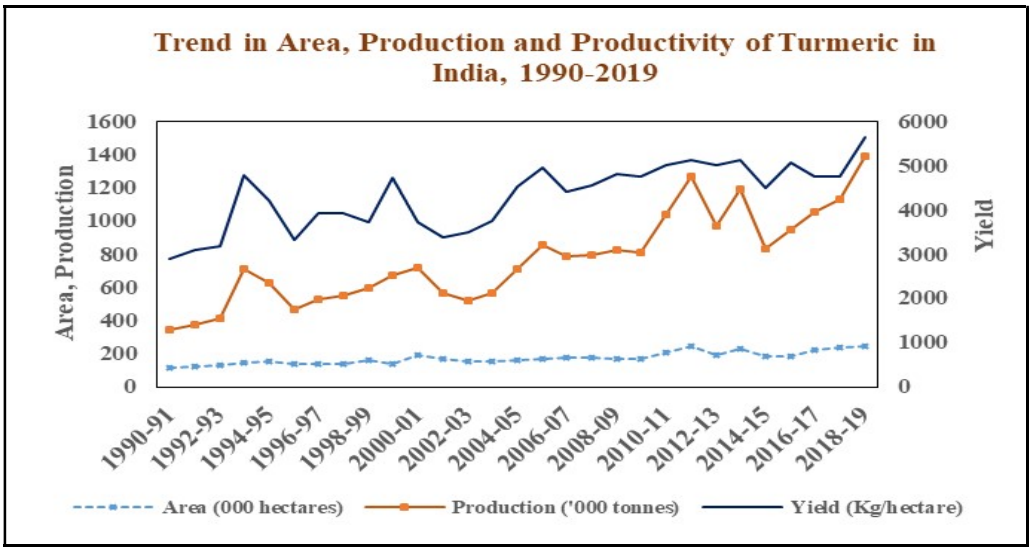
Market Trends

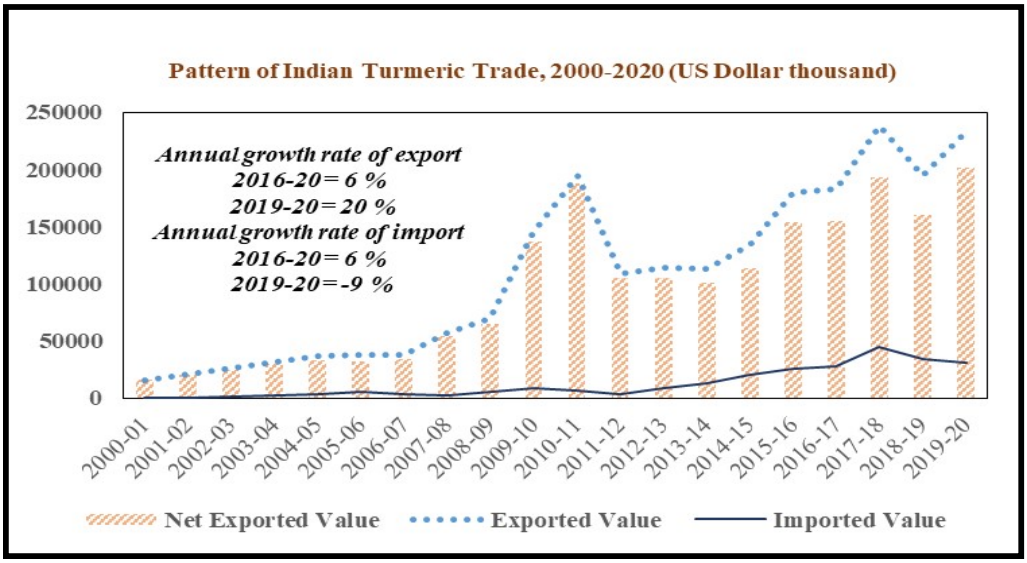
The performance of turmeric within the country in terms of area expansion and production and global performance can be visualized from figure 1. India being one of the major producers of turmeric, contributes 80% to global production. In the year 2018-19, turmeric production was 389 thousand tonnes, with area and productivity 246 thousand hectares and 5646.34 kg per hectare respectively. The growth pattern of the area, production, and productivity of turmeric over the period of time indicate the growing contribution of production over the area expansion to the increased yield. In the international market, India is a net exporter of turmeric and earned201,152 Thousand US Dollars in 2020. The USA is the largest consumer of Indian turmeric, imported 22 percent of the total exported value, followed by Bangladesh (18%), Iran (6%), and UAE (5%) in the last year. Some of the other importing countries are Malaysia, UK, Morocco,

Germany and Japan. As already mentioned the COVID-19 pandemic particularly elevated turmeric sales, both in the form of fresh and dried. Also, turmeric is used as one of the common ingredients in daily uses grocery for example as turmeric jaggery. The sale has been also appreciable in the international market i.e. the exported value of the turmeric jumped to 20 % in the last year as compared with 6% growth in 2016-20. This opportunity can be utilized further by introducing some new innovative products and recipes. In this way, north eastern states can also benefit large that we discuss briefly below.

Opportunity for north-eastern states to prosper by turmeric cultivation and marketing North-eastern states, particularly Mizoram and Sikkim are recognized as abnormally high productivity states in turmeric cultivation because of their higher yield. Also, they have the advantage of recognition for organic production. In addition, under the National Mission for Sustainable Agriculture (NMSA), the Ministry of Agriculture and Farmers Welfare launched Central Sector Scheme, Mission Organic Value Chain Development for North East Region (MOVCD-NER) to support the development of value chain starting from input supply, certification, to the creation of facilities for aggregation and processing of the product. There are 33 clusters in Manipur operating under MOVCD-NER, also Assam and Sikkim have better geographic coverage of FPOs (Farmer Producer Organizations). By promoting such practices in other north-eastern states, they can exploit this niche market in near future.

Another important policy strep i.e. “One District One Product” under Centrally Sponsored Scheme PMFME (PM Formalisation of Micro food processing Enterprises Scheme), Turmeric is listed in the selected product in all of the North-eastern states, this is an additional scope under which states can be encouraged to adopt cluster approach and group approaches such as FPOs, SHGs (Self Help Groups) and producer cooperatives. This will help to bring the win-win situation to both farmers and the microenterprises. Also, except Assam, the spread of formal/organized food processing units are scanty, the innovation centre for developing value-added products from the traditional knowledge can be encouraged so that in the long run the product can be easily scaled up.





2. Review of literature and development in the subject:

Choudhury K and Kalita D C [3], and Sahu S et al [14] Studied Growth and instability in area, production and productivity of turmeric in Assam and Maharashtra states India is popularly known as the "Spices Bowl of the World" as a many varieties of spices grown in the country since ancient times. Turmeric is one of the oldest spices that's why it is called as "Indian Saffron". Turmeric (Curcuma longa) is significant spice crop belong to the family zingiberaceae. It is rhizomatous herbaceous plant which is originated from India. The purpose of the present investigation is to examine the growth performance and instability in area, production, and productivity of turmeric in Maharashtra. The performance of turmeric was quite effective with respect of the area

expansion as well as production in Western Maharashtra, Marathwada and Vidarbha region from the introduction of turmeric in Maharashtra. It was discovered that rather than production and productivity, the area under the turmeric in Maharashtra was more stable and consistent.

Turmeric is produced, consumed, and exported mostly in India. Central and Latin America, Thailand, various Southeast Asian nations, and Taiwan are even significant producers. The annual global production of turmeric is about 11 lakh tonnes. India leads the global production scenario with a contribution of 80 percent, followed by China with 8 percent, Myanmar with 4 percent, and Bangladesh and Nigeria together with 6 percent of the total production. The area, production and productivity of turmeric was fluctuating during the year 2018-19 to the year 2022-23 in Maharashtra. There is an increase in area from 17.224 thousand ha in 2018-19 to 83 thousand ha in 2022-23. Similarly, the production has increased from 38.310 thousand tons in 2018-19 to 278 thousand tons in 2022-23. The productivity has increased from 2224 kg/ha in 2018-19 to 3349 kg/ha in 2022-23. Turmeric is grown in some the districts of Maharashtra.

Patare S D *et al*. [10] studied on The Trends and Growth Analysis in the Area, Production and Productivity of Turmeric. Turmeric is an important spice crop grown in Chhattisgarh. The present study is mainly based on time series data. The secondary data on area, production and productivity of Turmeric in Chhattisgarh, were collected for the period 2001-02 to 2020-21from various publications. To analyze the trends and growth rate in the area, production and productivity of turmeric in Surguja district of Chhattisgarh state. The performance of turmeric was examined by estimating the growth rates and instability index of area, production and productivity of turmeric.

Mane U.S. *et al*. [7] Investigation regarding an economic analysis of turmeric arrivals and price behaviour in Sangli district of Maharashtra was carried out during the year 2009-2010. Data were collected for the year 2000-2001 to 2010-2011 from Sangli APMC. Growth rate and trend equation were used for analysis of data. The result revealed that maximum arrival index was 261.22per cent in the month of March were and minimum arrival index 24.78 per cent in the month of October. Price index was maximum125.45 per cent in the month of September while it was minimum 88.06 per cent in the month of December. It was observed that there was inverse relationship between arrivals and prices of turmeric in Sangli market. The present study incorporates

various econometric models to understand the price volatility and interdependencies of the turmeric which is the highest producing agro products of Kalahandi, Odisha. The primary objective of the paper is to highlight the price dependencies of the turmeric throughout the India and confirming which particular state is helpful to explain the prices of turmeric that will support the farmers in forecasting the demand and supply and price fixation to sell within the state or across the border.

Arya Kumar, [1] Highest producer as to the highest price seeker- a study on price dependency of turmeric in india. The price forecasting and dependency of agricultural product is one of the most weak form of prediction as any events or acts affects the prices of agro products in large. The present study incorporates various econometric models to understand the price volatility and interdependencies of the turmeric which is the highest producing agro products of Kalahandi, Odisha. the present paper considered the weekly prices of turmeric for last nine years of Odisha and other states of India for explaining the price dependencies and volatility as an issue for price fixation. The paper used GARCH (1, 1) for volatility confirmation which states the turmeric price of Odisha is highly volatile and persistent due to the highest producer of India but weak in price fixation.

Growth and Forecast Performance of Turmeric in India by Murugananthi, D. [8]. An Empirical Analysis attempt has been made in this paper to analyze the time series components in turmeric price by using 22 years price data across major Indian turmeric markets. Increasing trend in price was observed over the years across the markets. Erode and Nizamabad market has showed similar seasonality, where as Sangli price showed a different seasonality. Presence of price cycles was analysed using Bry-Boschan algorithm. Results revealed that Erode, Nizamabad and Sangli turmeric prices have shown four, three and five trough to trough cycle, respectively. Number of cycles has been varied depending upon the selling behaviour of the farmers and additional production risk in each State. Higher time has been noticed in slump phase than in boom. Percentage of price changes in slump was higher than in peak. Predicting the occurrence of cycles in turmeric price would help the farmers to make their sowing and selling decisions. Turmeric farmers could be made aware about the peak and slump price in order to reduce the price risk in cultivation of turmeric. The acreage under the crop during slump phase may be reduced to avoid the loss.

According to R. Prabhu and V. Saravanakumar. [11] India is the world's main supply of turmeric, accounting for more than 90 per cent of the global turmeric trade. Considering the economic importance of this crop, an attempt has been made to assess the performance of turmeric in terms of area and production, as well as the cost of cultivation in India. Aside from that, the study used the Auto-Regressive Integrated Moving Average (ARIMA) model to project the price of turmeric in the future. The results of growth analysis of turmeric area and production in India using secondary data from 1950-51 to 2020-21 through compound growth rate revealed a positive growth pattern of the area, production, and productivity at rates of 2.60, 4.02, and 1.40 per cent per year, respectively. A total of Rs. 3,08,511 was required for one hectare of turmeric output. According to the results of forecasting methods, the price of turmeric would be Rs. 7179, Rs. 7172, Rs. 7170, Rs. 7170, and Rs. 7170 per quintal in May, June, July, August, and September, respectively, assuming the current growth rate remains the same. Due to increased turmeric arrivals, the expected values of turmeric price exhibited a falling trend in the next five months. Hence, the government should increase and maintain funding for turmeric development programmes, given the importance of turmeric in terms of export revenues and domestic requirements. If these challenges are solved, there is a lot of space to increase turmeric production in the future.

R. Govindasamy [12] has studied on Production and Export Performance of Turmeric in India. Turmeric is also called as "Indian saffron". Turmeric is an important spice among the rice eating peoples of India, South East Asia and Indonesia, In India, turmeric cultivated important States of Andhra Pradesh, Maharashtra, Orissa, Tamil Nadu, Karnataka and Kerala. India is the largest producer and consumer of turmeric in the world. Indian turmeric contributes about 78% world production and 60% of the exports of Turmeric. Under Turmeric had increase from 139300 hectares in the year 1995-96 to 219000 hectares during 2012-13. The area indices worked out for Turmeric showed fluctuating trend. The production of Turmeric was maximum during the year 2012-13 with 1167000 tonnes. The Export of Turmeric has increased from 23,018.83 tonnes in 1996-97 to 52,861.32tonnes during 2012-13.

Jadhav V.G. *et al*. [6] studied on "Export Performance of Turmeric in India". This study was aimed at investigating the nature of data for study is mainly based on secondary sources. The nature of data for study is mainly based on secondary sources. The time series data was obtained for 20 years from the year 2000-01 to 2019-20. The

period of study was divided into different periods, i.e. Period I (2000-01 to 2009-10), Period II (2010-11 to 2019-20) and Overall period (2000-01 to 2019-20). The data on export quantity and value were collected from the Directorate General of Commercial Intelligence and Statistics (DGCIS), Government of India, Food and Agriculture Organization (FAO) and National Agricultural Processed Food Product Export Development Authority (APEDA). To examine the growth in export of turmeric from India compound growth rate (CGR) was computed based on its fit using non-linear models, especially the exponential model. Coefficient of variation and Cuddy-Della Valle Instability Index will be used to estimate the instability in export of turmeric data. The present study was undertaken to analyse growth rates and instability in export of turmeric. The study revealed that, compound growth rates were found positive and statistically significant at 1 percent level of significance for all periods for quantity, value in rupees and value in dollar except for value in US dollar in period II. It's significant at 10 percent level of significance. CV and CDI of turmeric export measured in quantity was 0.47and 0.15 respectively. It was 0.87 and 0.32 for value in rupees and 0.74 and 0.31 for value in dollar respectively. Thus, the export of turmeric from India in terms of quantity, value in rupees and value in dollar were not steady during the reference period. So, the government of India should take the necessary steps to increase both area and production by way of more subsides (irrigation, fertilizer and insecticides, etc.) and introduces high yield varieties of turmeric seeds.

3. The Scope of Study:

1. Spices export seems to be the engine of growth in exports, for agrarian economies of developing countries like India. The exports from a country are highly dependent on production and export prices.
2. The export scenario of turmeric in the country is faced with competition from other producing countries of turmeric. Besides that, there have been some changes in area under turmeric as a result of price fluctuations when compared to past.
3. The analysis of export competitiveness and price behaviour of turmeric would focus on the need to revitalize the situation.
4. Efforts for broad basing the turmeric export basket by value addition and product diversification to meet global quality standards and exploring the scope for production and export of turmeric would bring about bright prospects for the Indian economy.

4. Objectives of the Research:

The primary objectives of this research are as follows:

1. To study the growth performance of turmeric in selected markets of Maharashtra
2. To analyse the turmeric price behaviour in selected markets of Maharashtra
3. To predict the turmeric prices in selected markets of Maharashtra
4. To evaluate the export performance of Turmeric

5. Methodology:

Secondary data needed for the study that is selected market wise, year wise and district wise area, production and productivity of the selected crop enterprise will be obtained from different sources viz. Directorate of Statistics and Evaluation, Government of Maharashtra and other related institutes, AGMARKNET, APEDA, NHB, NHRDF, APMC, DGCIS, Annual Report.

1) Collection of relevant literature from authentic sources in India.
2) Consultations with expertise on topic relevant to proposed work
3) The Statistical approach will be undertaken for the research development.
4) Advanced Statistical tools like ARCH- GARCH, ARIMA, CDVI, ANN, CAGR, Markov chain Analysis, etc. will be used to achieve the objectives of proposed research study.

6. Proposed work plan

- **First Year**

  In depth study around research topic areas such as: Export dynamics and price behaviour of turmeric, review of literature regarding Price behaviour and export performance of turmeric.

- **Second Year**

  Selection of Major turmeric markets along with districts on the basis of area and production in Maharashtra state. Secondary data will be collected from selected markets and which is to be analyzed by adapting suitable statistical techniques mentioned in methodology. The research article will be published on analysed results.

- **Third Year**

Start to initial chapter wise write up as per prescribed in index and submit it for getting feedback and suggestions then articles will be published. Finalize the write up by revising initial write up as per suggestions given by experts and submit it for final print bind.

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